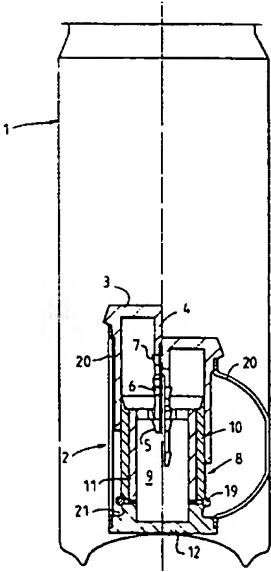


PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

| | | |
|---|-----------|---|
| (51) International Patent Classification 5 : B65D 25/02 | A1 | (11) International Publication Number: WO 93/24384 (43) International Publication Date: 9 December 1993 (09.12.93) |
| (21) International Application Number: PCT/GB93/01159 (22) International Filing Date: 1 June 1993 (01.06.93) (30) Priority data: 9211814.0 4 June 1992 (04.06.92) GB 9214793.0 11 July 1992 (11.07.92) GB (71)(72) Applicants and Inventors: COSTELLO, Edward, Roger [GB/GB]; 86 Cannon Hill Road, Coventry, Warwickshire CV4 7BS (GB). KERSHAW, Peter, Frank [GB/GB]; 136 Mayfield Close, Catshill, Bromsgrove, Hereford & Worcestershire B61 0NP (GB). (74) Agent: CHAPPLE, Colin, R.; Evershed Wells & Hind, 10 Newhall Street, Birmingham B3 3IX (GB). | | (81) Designated States: AU, BR, CA, JP, NZ, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> |
| (54) Title: INSERTS FOR DRINKS CONTAINERS  (57) Abstract <p>The object of the invention is to provide an advantageous insert to be put in a container for a drink under pressure in order that, when the container is opened, matter is released from the insert into the drink to modify the nature of that drink. The insert comprises a vessel having a hollow part (3), closed at one end and open at the other, slidably and sealingly engaged within the open end, a plunger part (8) and valve means permitting only under certain relative pressure conditions inside and outside the vessel egress of matter from the vessel or ingress of matter into the vessel.</p> | | |

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCI on the front pages of pamphlets publishing international applications under the PCT.

| | | | | | |
|----|--------------------------|----|---------------------------------------|----|--------------------------|
| AT | Austria | FR | France | MR | Mauritania |
| AU | Australia | GA | Gabon | MW | Malawi |
| BB | Barbados | GB | United Kingdom | NL | Netherlands |
| BE | Belgium | GN | Guinea | NO | Norway |
| BF | Burkina Faso | GR | Greece | NZ | New Zealand |
| BG | Bulgaria | HU | Hungary | PL | Poland |
| BJ | Benin | IE | Ireland | PT | Portugal |
| BR | Brazil | IT | Italy | RO | Romania |
| CA | Canada | JP | Japan | RU | Russian Federation |
| CF | Central African Republic | KP | Democratic People's Republic of Korea | SD | Sudan |
| CG | Congo | KR | Republic of Korea | SE | Sweden |
| CH | Switzerland | KZ | Kazakhstan | SK | Slovak Republic |
| CI | Côte d'Ivoire | LI | Liechtenstein | SN | Senegal |
| CM | Cameroon | LK | Sri Lanka | SU | Soviet Union |
| CS | Czechoslovakia | LU | Luxembourg | TD | Chad |
| CZ | Czech Republic | MC | Monaco | TG | Togo |
| DE | Germany | MG | Madagascar | UA | Ukraine |
| DK | Denmark | ML | Mali | US | United States of America |
| ES | Spain | MN | Mongolia | VN | Viet Nam |
| FI | Finland | | | | |

- 1 -

DescriptionINSERTS FOR DRINKS CONTAINERS5 Technical Field

The invention concerns inserts to be put in containers for drinks under pressure in order that, when the container is opened, matter is released from the insert
10 into the drink in the container to modify the nature of that drink.

Background Art

15 Inserts of a variety of types have been proposed for inclusion in cans of beer under pressure with the object of releasing gas into the beer when the can is opened and thereby to cause the formation of an enhanced 'creamy' head on the beer. The known inserts have not
20 been entirely satisfactory and are of limited applicability.

Disclosure of Invention

25 According to the invention an insert to be put in a container for a drink under pressure in order that, when the container is opened, matter is released from the insert into the drink in the container to modify the nature of that drink comprises a vessel comprising a
30 hollow part, closed at one end and open at the other and, slidably and sealingly engaged within the open end, a plunger part and valve means permitting only under certain relative pressure conditions inside and outside the vessel egress of matter from the vessel or ingress
35 of matter into the vessel.

- 2 -

Before the insert is put into a drink container e.g. a can or a bottle, the vessel is filled with suitable matter for the desired effect and the matter should be
40 substantially compressible e.g. a gas or a liquid together with a substantial volume of gas. The gas may be any gas tolerable in the context of the drink, the container and the insert and may, for example, be air, nitrogen or carbon dioxide. When the insert is in its
45 initial condition ready for putting into the container, the gas, whether or not a liquid is also present, may be at zero gauge pressure or at a higher pressure.

If the purpose of the insert is only to modify the head
50 of the drink e.g. in the case of beer, the matter in the vessel may be only a gas or a gas together with a liquid not substantially affecting the flavour of the drink. However, if it is desired to modify the flavour of the drink initially in the container, the vessel of the
55 insert may contain a gas and a suitably flavoured liquid: for example, if the drink in the container is tonic water, the vessel of the insert may contain a gas and gin. An example of another alternative is that the vessel of the insert may contain a fruit juice.

60 Inserts according to the invention may be used in relation not only to a variety of alcoholic final drinks but also in relation to a variety of non-alcoholic final drinks e.g. fruit juice-based and milk-based drinks.
65 The insert may be of particular value in cases where the final drink desired is a mixture of ingredients which when mixed are of limited shelf life.

The valve means may include an aperture having a
70 distinct closure member displaceable under certain

- 3 -

relative pressure conditions inside and outside the vessel of the insert so that it then ceases to close the aperture. In one preferred form of insert the valve means is however provided by the vessel having a part
75 which under certain relative pressure conditions inside the vessel of the insert is broken thereby permitting egress of matter in the vessel out of the vessel. In another preferred form of insert the valve means comprises an element which under certain relative
80 pressure conditions inside and outside the vessel punctures a wall of the vessel thereby permitting egress of matter in the vessel out of the vessel.

When an insert according to the invention is put into a
85 drink container and the drink also put into the container and the container sealed to maintain an internal superatmospheric pressure, the plunger part of the vessel is forced further into the hollow part of the vessel by the excess external pressure and the gas in
90 the vessel is thereby compressed to a higher pressure than that in the initial condition of the insert when ready for insertion into the container. Correspondingly, when the drink container is opened, the external pressure on the vessel of the insert is suddenly reduced
95 and by virtue of the valve means the matter in the vessel may be at least partially discharged into the drink in the container. The fact that during the filling of the container the plunger part of the vessel is forced further into the hollow part is advantageous
100 in that it creates more space for the drink and allows space for a head to be formed on the drink in the container when it is opened.

In the case of valve means having an aperture and a
105 distinct displaceable closure member the valve opens as

- 4 -

a result of displacement of the closure member from the aperture whilst if the valve means is provided by the vessel having a breakable part it is the breaking which creates the necessary aperture. Where the valve means
110 comprises a puncturing element it is the puncturing which creates the necessary aperture and in this case it is preferred that the valve means is such that as the plunger part of the vessel is forced further into the hollow part the puncturing element of the valve means is
115 increasingly distorted and engages increasingly firmly against or into (but not through) a wall of the vessel. Correspondingly, when the drink container is opened, the external pressure on the vessel of the insert is suddenly reduced and the resultant relative movement of
120 the parts of the vessel causes the valve means to operate and the matter in the vessel is at least partially discharged into the drink in the container. The puncturing element of the valve means is such that when the parts of the vessel suddenly move apart as a
125 result of the opening of the container the distortion of the puncturing element is reversed and it completely punctures the wall against or into which it was engaged.

An insert according to the invention preferably has
130 externally means to retain the insert in a particular position in the drink container, preferably in a generally upright position resting on the interior of the base of the container. Such means do not interfere with the insertion of the insert into the container and
135 may comprise flexible wings, fins or spokes adapted to bear at or near their extremities against the inner side wall of the container. It is particularly preferred that the retention means should be provided by the insert having a foldable frame, attached to the vessel
140 at or adjacent the closed end of the hollow part and at

- 5 -

or adjacent the outer end of the plunger part. The foldable frame is preferably so dimensioned that, when the insert is ready for insertion into the drink container, the components of the frame fit closely
145 against the exterior of the vessel (thereby not interfering with insertion of the insert into the drink container) but when the plunger travels further into the hollow part of the vessel, and thereby reduces the overall length of the vessel, the frame is caused to
150 fold outwardly and can thus bear against the inner side wall of the drink container to retain the insert in position. The retention means is advantageous in that it enables the insert to be firmly held in position whilst enabling it to be readily inserted into
155 containers having a variety of top aperture sizes prior to closure. It is preferred that the insert should be such that at the place or places where matter in the vessel is released to the exterior of the vessel there should be a narrow channel or channels such that the
160 matter in the vessel passes to the exterior as a fine jet or jets. If the drink in the container is beer, the fine jet or jets promotes the formation of a 'creamy' head. If the valve means is such that when it opens a relatively large open aperture is provided through which
165 matter in the vessel may pass out, it is preferred that the insert should be such that the matter does not pass directly to the exterior of the vessel from the large aperture but first passes through a narrow channel or channels as just indicated. It is particularly
170 preferred that the fine channel or channels should be provided by the insert having, at the place where matter in the vessel is to pass to the exterior of the vessel, a socket in which is located a plug, the plug and/or the socket walls having a fine groove or grooves through
175 which matter in the vessel can pass to emerge at the exterior of the vessel as a fine jet or jets.

- 6 -

Brief Description of Drawings

180 The invention is further described with reference to the
accompanying drawings in which:

185 Figure 1 is a vertical section through a drink can
containing an insert according to the invention
shown partly in one condition and partly in another;

190 Figure 2 is a vertical section through the can and
insert of Figure 1 but showing the insert partly in
one further condition and partly in another further
condition;

Figure 3 is a plan view of a portion of the insert
of Figures 1 & 2;

195 Figure 4 is a horizontal section through the insert
of Figures 1, 2 & 3 near its base;

200 Figure 5 is a side view of the insert of Figures 1
to 4 at the level of the section of Figure 4;

Figure 6 is a vertical section through another form
of insert according to the invention shown partly in
one condition and partly in another;

205 Figure 7 is a vertical section through a further
insert according to the invention shown partly in
one condition and partly in another; and

210 Figure 8 is a plan view of a detent washer forming
part of the insert of Figure 7.

- 7 -

Referring to Figure 1, a drink can 1 has within it an insert 2 resting on the interior of the base of the can. The left hand side of the section through the insert shows the insert in its initial condition i.e. as inserted into the can. The insert comprises a vessel comprising a generally cylindrical hollow part 3, closed at its upper end and open at its lower end and having an internal split axial stem 4 having detents 5, 6 & 7.

Slidably and sealingly engaged within the open end of the hollow part 3 is the upper end of a generally cylindrical plunger part 8, having an internal cavity 9 and together with the hollow part 3 forming the vessel. At its upper end the plunger part is open to the hollow of the hollow part 3 but the lower end of the plunger part is closed.

The plunger part 8 has an outer wall component 10 an inner wall component 11 and a base component 12. The top of the plunger part 8 as far out as the outer surface of the inner wall component 11 is shown in Figure 3 and comprises a central hub 13 having a part conical aperture 14 and spokes 15 between which are generally segmental apertures 16.

Near the base of the plunger part, the part has the section shown in Figure 4, conical apertures 17 through the inner wall component opening into slots 18 in the outer wall component. Around the periphery of the plunger part at the level of the slots 18 and sealing those slots from the exterior is a sealing ring 19 of elastomeric material forming a valve means in relation to the slots.

245

- 8 -

Secured adjacent the top of the hollow part 3 and adjacent the bottom of the plunger part 8 are straps 20 of resilient material forming a foldable frame for the insert.

250

When the can is filled e.g. with beer to a level somewhat below the top and sealed with an internal pressure of say 30 p.s.i., the hollow part 3 is forced some distance down over the plunger part 8 and the insert then has the condition shown at the right hand of Figure 1, detent 6 having been forced through the aperture 14.

255

Subjecting the sealed can to a pasteurisation process increases the internal pressure and the insert then adopts the condition shown at the left hand of Figure 2, detent 7 having been forced through and beyond the aperture 14. On opening the can the release of the external pressure on the insert and the internal pressure in the insert results in the insert having the condition shown at the right hand of Figure 2, the insert expanding somewhat lengthwise but such expansion being limited by engagement of the detent 7 with the underside of the perimeter of the aperture 14.

260

265

270

On opening of the can and the insert adopting the condition shown at the right hand of Figure 2, it may be noted that the sealing ring is displaced from its sealing position into a recess 21 (Figure 1) where it is then held. Accordingly, at this stage the ring ceases to be a closed valve and permits discharge of matter in the vessel into the drink in the container.

275

It is to be noted that once the insert is in the can under pressure and sealed, the straps 20 fold outwardly

280

- 9 -

to retain the insert in position in the container. Because of the action of the detent 7 noted in the preceding paragraph, the straps still serve to retain the insert in position once the can has been opened.

285

Referring now to Figure 6, the insert is broadly similar to that of Figure 1 to 5 and comprises a vessel comprising a generally cylindrical hollow part 103, closed at its upper end and open at its lower end and having an internal axial stem 104 having detents 105, 106 and 107 and, slidably and sealingly engaged within the open end of the hollow part 103, the upper end of a generally cylindrical plunger part 108, which parts together with the hollow part 103, form the vessel. At its upper end the plunger part is open to the hollow of the hollow part 103 but the lower end of the plunger part is closed.

290

295

300

The plunger part has an outer wall component 110, an inner wall component 111 and a base component 112. The top of the plunger part 108 as far out as the outer surface of the inner wall component 111 is generally of the structure shown in Figure 3.

305

310

The lower portion of the plunger part 108 differs from that of the plunger part 8 of the insert of Figures 1 to 5 in that there are no apertures and slots nor a ring of elastomeric material nor a recess for the ring to be displaced into. Also, near the upper end of the plunger part 108 there is an annular recess 121 in which is a sealing ring 122 to provide for slidable, sealing engagement between the part 108 and the hollow part 103.

315

Secured adjacent the top of the hollow part 103 and adjacent the bottom of the plunger part 108 are straps

- 10 -

120 of resilient material forming a foldable frame for the insert and these straps are shown only in part at the right hand side of Figure 6.

320 When the insert is initially introduced into, for example, a can for beer it has the configuration shown at the left hand side of Figure 6. On filling the can and sealing it with an internal pressure of say 30 p.s.i., the hollow part 103 with its axial stem moves
325 down to a position where the detent 106 occupies the position originally occupied by the detent 105. After the pasteurisation process the hollow part 103 moves down further and takes up the position shown at the right hand side of Figure 6.

330 The stem 104 of the insert of Figure 6 differs from the stem 4 of the insert of Figures 1 to 5 in that it has an axial internal bore 123 open at the top and continuing as far down as shear section 124. On opening the can
335 containing the insert, the rapid reduction in the external pressure on the insert results in the hollow part, with the axial stem, moving suddenly upwards away from the plunger part 108 and the upper face of the detent 107 striking the lower face of the matter
340 defining aperture 125. This striking results in the lower part of the stem 104 shearing off from the upper part of the stem and the contents of the insert are then free to pass through the bore 123 into the drink in the can to produce the desired effect. It may be
345 appreciated that the stem 104 with its internal bore and its shear section provides valve means for the insert.

Referring to Figure 7, the left hand side of the section through the insert shows the insert in its initial
350 condition i.e. as inserted into, for example, a drink

- 11 -

can. The insert comprises a vessel comprising a generally cylindrical hollow part 201, closed at its upper end and open at its lower end, and a generally cylindrical plunger part 202, having its upper end
355 slidably and sealingly engaged within the open end of the hollow part 201. At its upper end the plunger part is open to the hollow of the hollow part 201 but the lower end of the plunger part is closed.

360 The plunger part 202 has an outer wall component 203, an inner wall component 204 and a base component 205. In a recess at the top of the inner wall component 204 is a detent washer 206 of hard resiliently deformable matter to serve as a puncturing element of valve means. As
365 shown in Figure 8, the washer 206 has 2 sharp points 207.

The hollow part 201 has an outer wall component 208, an inner wall component 209, a top component 210 and an axial stem 211. When the insert is in its initial
370 condition as shown by the left hand side of Figure 7, the inner part of the washer 206 bears against, and partly into, lower part 212 of the axial stem 211 and is downwardly deformed to some extent.

375 Secured adjacent the top of the hollow part 201 and adjacent the bottom of the plunger part 202 are straps 213 of resilient material forming a foldable frame for the insert. At the left hand side of Figure 7 the strap is, for clarity, shown disengaged at the upper end from
380 the top of the hollow part 201 but upper part 214 of the strap would normally be engaged in recess 215. The strap 213 has integral hinges 219 and 220 to facilitate the strap taking up the configurations shown by means of broken lines at the right hand side of Figure 7.

385

- 12 -

When a can, for example, containing the insert is filled e.g. with beer to a level somewhat below the top and sealed with an internal pressure of say 30 p.s.i., the hollow part 201 is forced some distance down over the
390 plunger part 202 and the hollow part then has the position corresponding to upper part 214 of the strap 213 being at the intermediate one of the three positions shown at the right hand side of Figure 7.

395 Subjecting the sealed can to a pasteurisation process increases the internal pressure and the insert then adopts the condition shown at the lower right hand side of Figure 7, i.e. with the upper part 214 of the strap
400 213 at the lowest of the three positions. In this condition of the insert it may be noted that the inner part of the washer 206 is further downwardly deformed and leans against, and partly into, upper part 216 of the axial stem 11.

405 The upper part 216 of the axial stem 211 has an internal cavity 217 having thin walls and above that cavity is a plug 221 fixed in a recess, the plug having through jetting grooves 218 communicating with the cavity 217 and the exterior of the insert.

410 On opening of the can, the release of the external pressure on the insert and the internal pressure in the insert causes the part 201 suddenly to move upwardly in relation to the part 202 and the points of the washer
415 206 are thereby caused to puncture the thin wall of part 216 of the axial stem thus bringing the interior of the insert into communication with its exterior and permitting discharge of matter in the insert through the grooves 218 into drink in the can.

420

- 13 -

It is to be noted that once the insert is in the can under pressure and sealed, the straps 213 fold outwardly to retain the insert in position in the container.

425 The inserts of the invention may be made of plastics materials and/or metals and/or laminates e.g. plastics-coated metals.

- 14 -

Claims

430 1. An insert to be put in a container for a drink under
pressure in order that, when the container is opened,
matter is released from the insert into the drink in the
container to modify the nature of that drink, comprising
435 a vessel comprising a hollow part, closed at one end and
open at the other and, slidably and sealingly engaged
within the open end, a plunger part and valve means
permitting only under certain relative pressure
conditions inside and outside the vessel egress of
matter from the vessel or ingress of matter into the
440 vessel.

2. An insert according to claim 1 in which the valve
means comprises an aperture and a distinct closure
member displaceable under certain relative pressure
445 conditions inside and outside the vessel of the insert
so that it then ceases to close the aperture.

3. An insert according to claim 1 in which the valve
means is provided by the vessel having a part which
450 under certain relative pressure conditions inside and
outside the vessel of the insert is broken thereby
permitting egress of matter in the vessel out of the
vessel.

455 4. An insert according to claim 1 in which the valve
means comprises an element which under certain relative
pressure conditions inside and outside the vessel
punctures a wall of the vessel thereby permitting egress
of matter in the vessel out of the vessel.

460 5. An insert according to any preceding claim having
external means to retain the insert in a particular
position in the container.

- 15 -

- 465 6. An insert according to claim 5 in which the external means are flexible wings, fins or spokes.
- 470 7. An insert according to claim 5 in which the external means are provided by the insert having a foldable frame, attached to the vessel at or adjacent the closed end of the hollow part and at or adjacent the outer end of the plunger part.
- 475 8. An insert according to claim 7 in which the foldable frame is so dimensioned that, when the insert is ready for insertion into the container, the components of the frame fit closely against the exterior of the vessel but, when the plunger part travels further into the hollow part of the vessel, thereby reducing the overall length of the vessel, the frame is caused to fold outwards and thereby able to bear against the inner side wall of the container to retain the insert in position.
- 480 9. An insert according to any preceding claim in which at the place or places where matter in the vessel is to be released to the exterior of the vessel there is a narrow channel or channels such that matter passing from the vessel to its exterior emerges as a fine jet or jets.
- 490 10. An insert according to claim 9 in which at the place or places where matter in the vessel is to be released to the exterior of the vessel there is a socket in which is located a plug, the plug and/or the socket walls having a fine groove or grooves through which matter in the vessel can pass to emerge at the exterior of the vessel as a fine jet or jets.
- 495

- 16 -

500 11. An insert according to any preceding claim in which the matter in the insert is a gas.

12. A container containing a drink under pressure and an insert according to any preceding claim.

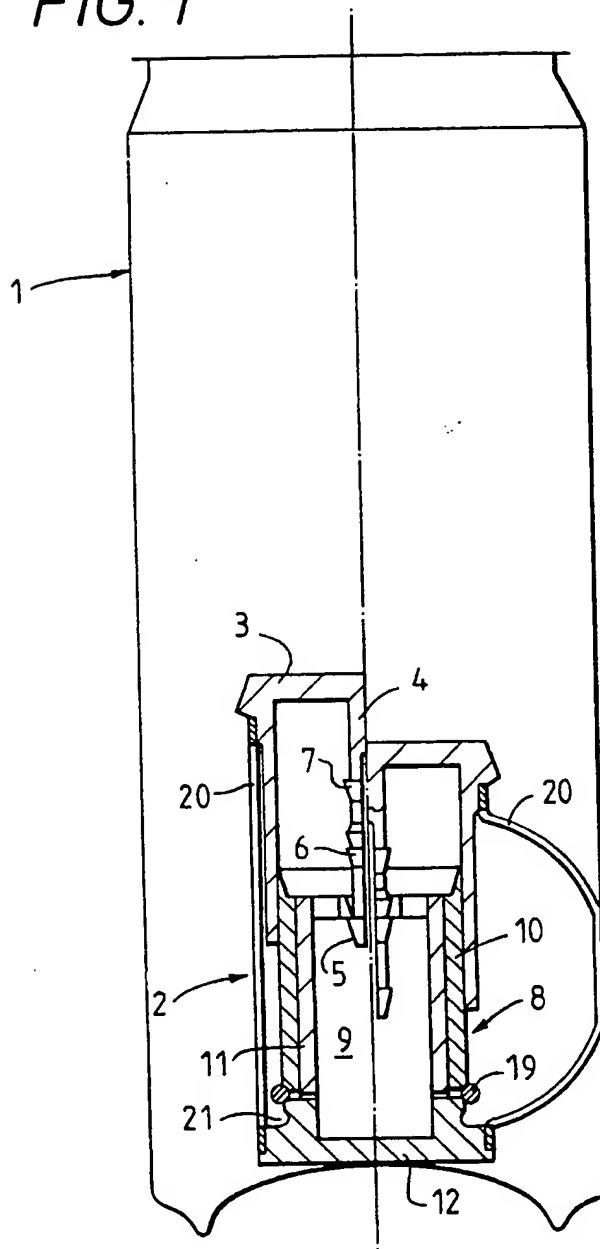
505 13. A container according to claim 12 in which the drink is beer.

510 14. A container according to claim 12 in which the matter in the vessel is a flavoured liquid.

15. A container according to claim 12 in which the drink is a fruit juice-based or milk-based drink.

1/5

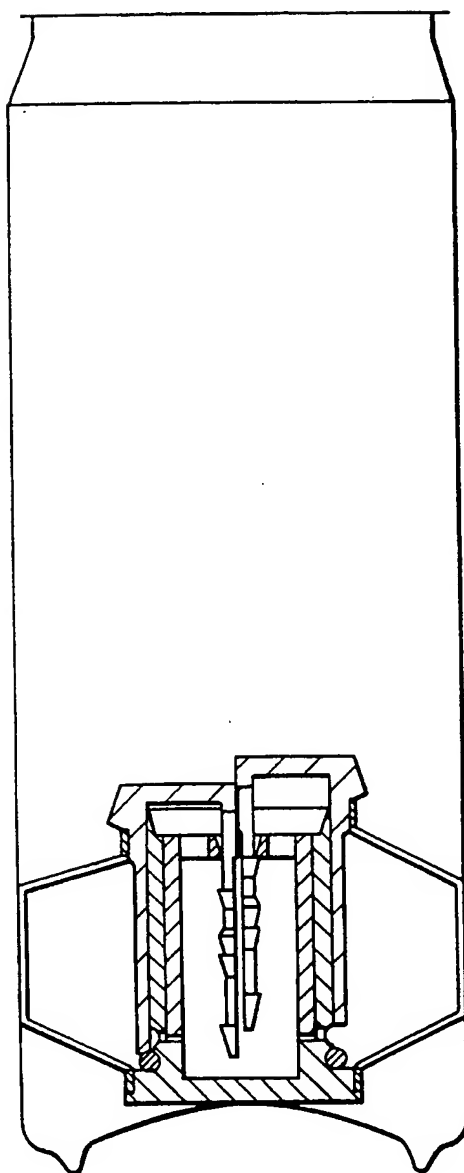
FIG. 1



SUBSTITUTE SHEET

2/5

FIG. 2



SUBSTITUTE SHEET

3 / 5

FIG. 3

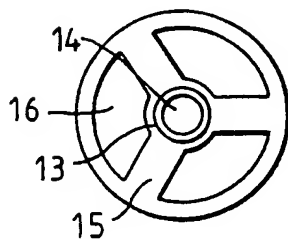


FIG. 4

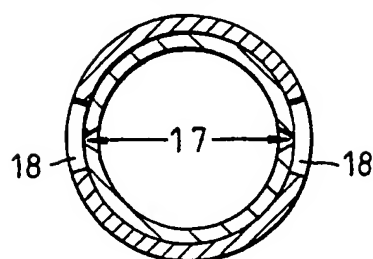


FIG. 5

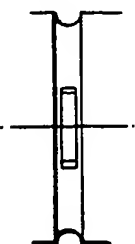
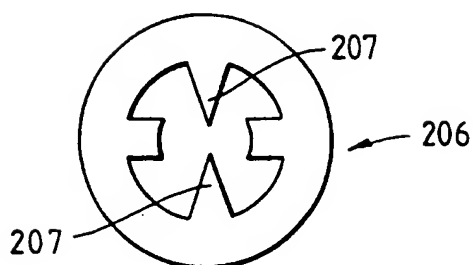
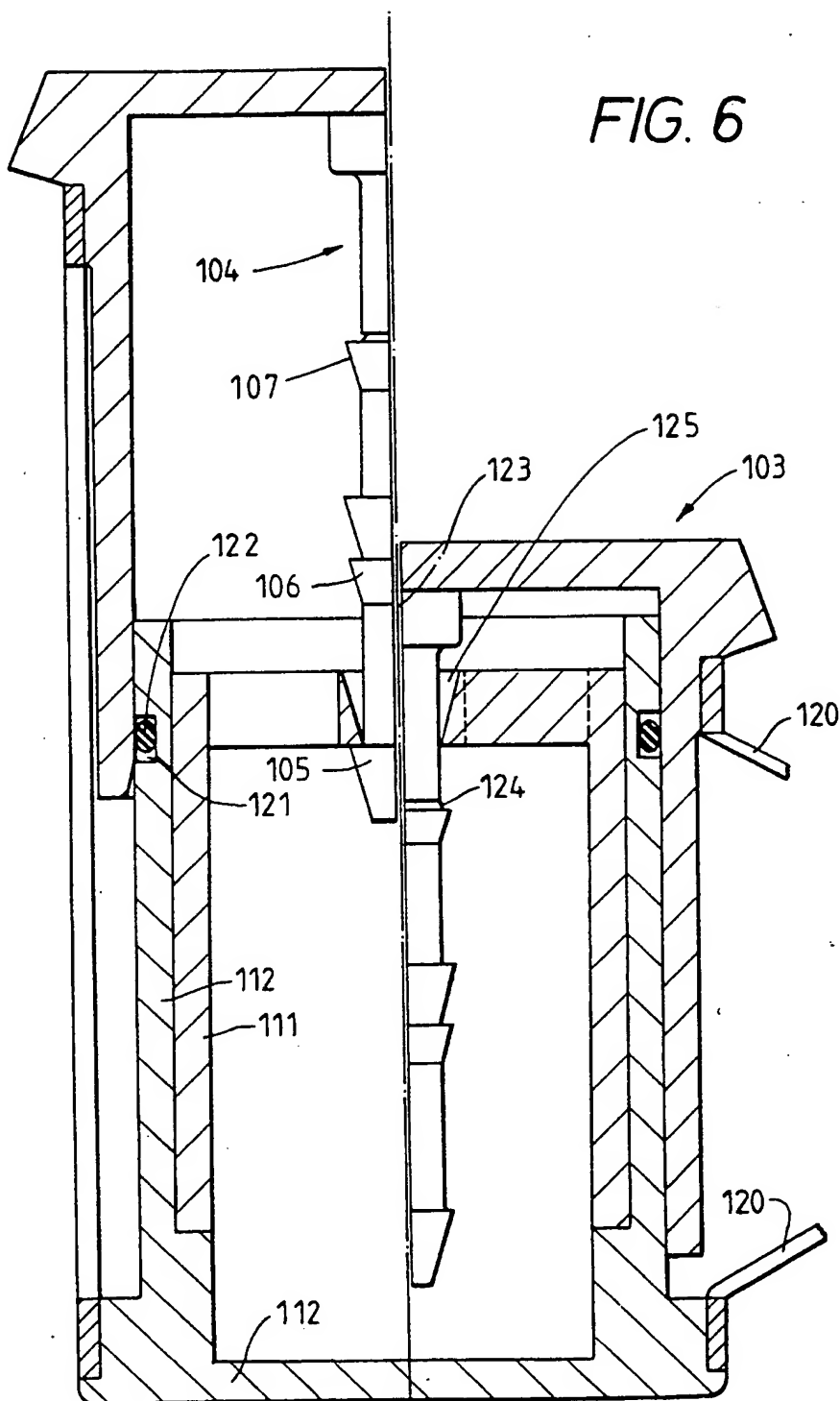


FIG. 8



4/5

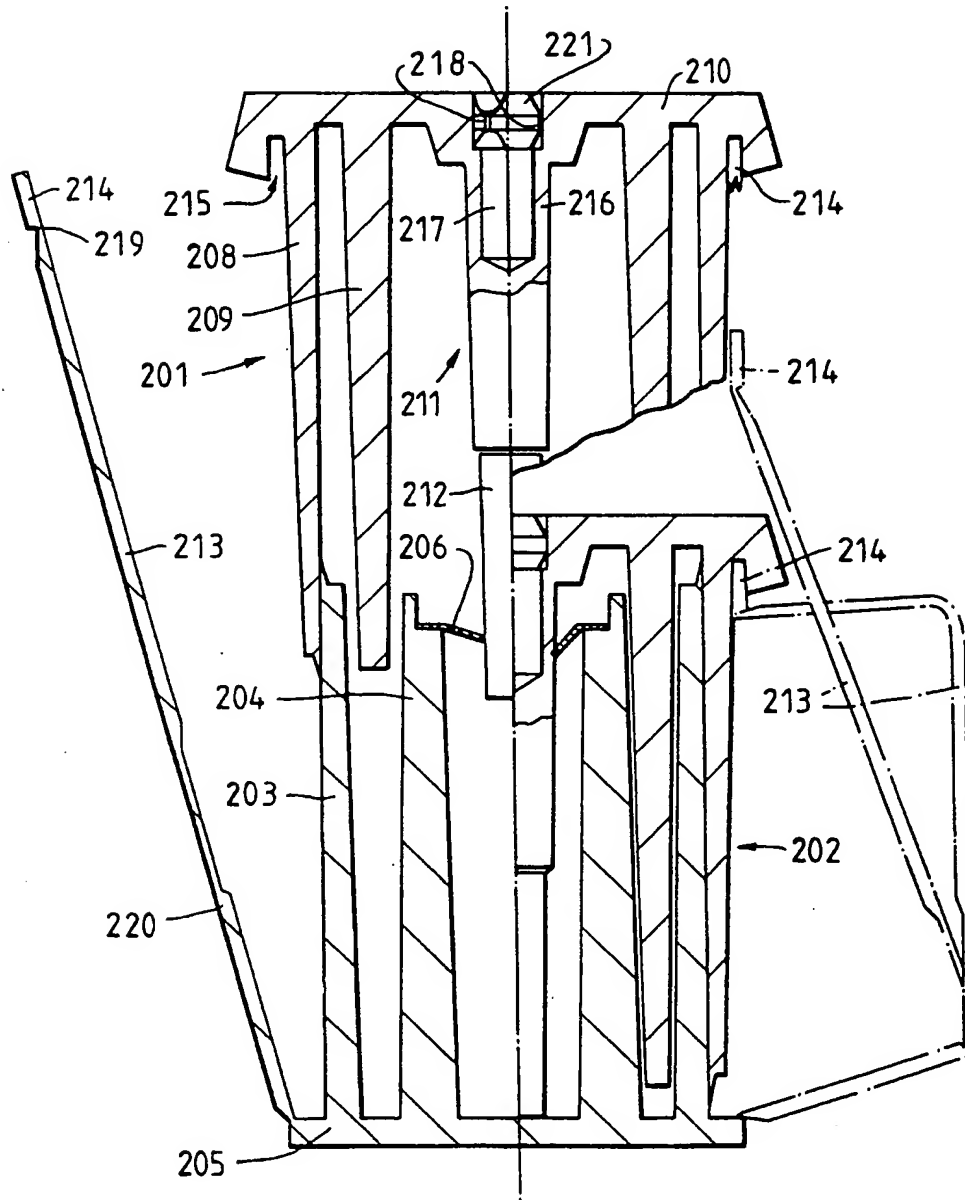
FIG. 6



SUBSTITUTE SHEET

5/5

FIG. 7



INTERNATIONAL SEARCH REPORT

PCT/GB 93/01159

International Application No

| | | |
|--|---|-------------------------------------|
| I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶ | | |
| According to International Patent Classification (IPC) or to both National Classification and IPC | | |
| Int.Cl. 5 B65D25/02 | | |
| II. FIELDS SEARCHED | | |
| Minimum Documentation Searched ⁷ | | |
| Classification System | Classification Symbols | |
| Int.Cl. 5 | B65D | |
| Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸ | | |
| III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹ | | |
| Category ^o | Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹² | Relevant to Claim No. ¹³ |
| X A | WO,A,9 107 326 (WHITBREAD) 30 May 1991 see abstract see page 15, line 1 - line 4 see page 16, line 4 - line 32 see page 17, line 30 - page 18, line 32; figures 1,6,8,18-22 | 1,2,5,9, 11-14 3,4 |
| X | WO,A,9 200 896 (E J PRICE) 23 January 1992 see the whole document | 1,2,9, 11,12 |
| <p>^o Special categories of cited documents : ¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p> | | |
| IV. CERTIFICATION | | |
| Date of the Actual Completion of the International Search | Date of Mailing of this International Search Report | |
| 16 SEPTEMBER 1993 | - 8. 10. 93 | |
| International Searching Authority | Signature of Authorized Officer | |
| EUROPEAN PATENT OFFICE | LEONG C.Y. | |

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.**

GB 9301159
SA 74871

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information. 16/09/93

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---------------------|----------------------------|---------------------|
| WO-A-9107326 | 30-05-91 | CN-A- 1054399 | 11-09-91 |
| | | EP-A- 0502059 | 09-09-92 |
| WO-A-9200896 | 23-01-92 | AU-A- 8109691 | 04-02-92 |
| | | EP-A- 0537238 | 21-04-93 |

EPO FORM P0079

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82